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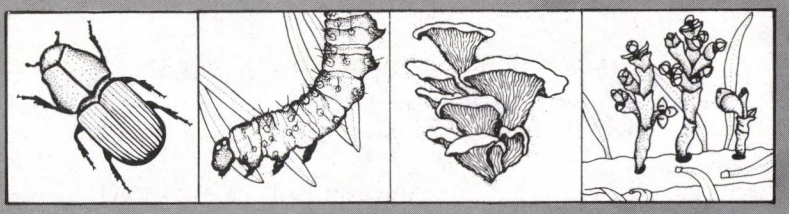

Report 83-7 3450
April 1983

STATUS OF DOUGLAS-FIR BARK BEETLE, MADISON RANGER DISTRICT, BEAVERHEAD NATIONAL FOREST, 1982

by

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ABSTRACT

Douglas-fir beetle has increased to epidemic levels in mature-overmature Douglas-fir that has been top killed by western spruce budworm. About 42 trees per acre have been killed in an area at Lyon's Face and 36 trees per acre in other areas along the Madison River during the past 3 years. Sufficient top kill has now occurred that an increase is predicted in Douglas-fir beetle activity for several years in defoliated and top-killed stands.

An aerial application of MCH is recommended to protect stands (important for wildlife habitat and in critical viewing areas) from further loss. Stand hazard rating and management, both silviculture and aerial spraying of budworm-infested stands, are recommended where economically and environmentally feasible to prevent further loss. Rapid salvage of windthrown Douglas-fir is recommended to reduce the potential buildup of Douglas-fir beetle populations.

INTRODUCTION

Mortality from Douglas-fir bark beetle is less common on east side forests than on west side forests in Region 1. Past outbreaks were triggered by windthrow, logging debris (>10 inches d.b.h.), and trees severely damaged by winter burn. Beetle populations that have increased to epidemic status cause tree mortality for 3-4 years, then rapidly decline to endemic levels.

The beetle prefers windthrown and windbroken trees, logging debris (>10 inches d.b.h.), trees damaged by ice and snow, and defoliated trees, in that order.

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Western spruce budworm populations began increasing in the Madison River drainage in 1971. Continuous defoliation resulted in top kill which became evident in 1977, and has since steadily increased.

Furniss et al. (1981) identified individual tree susceptibility characteristics as well as those factors which seem to delimit susceptible stands. Trees on which attacks are more dense and successful are those that are older, larger, more dominant, and produce more of the attractant resins. Stand characteristics linked with susceptibility are: (1) Density - Density-related factors reflect the importance of moisture stress and shaded stem environment. The denser the stand, the higher the susceptibility to the beetle. (2) Species diversity and habitat type - No definitive correlation between habitat type and beetle mortality has yet been developed; however, two of the more susceptible habitat types in northern Idaho are grand fir/pachistima and western redcedar/pachistima. Little mortality has been observed on Douglas-fir/elksedge habitat types or on most of the subalpine fir types in which Douglas-fir is seral. (3) Stand Age - Average age of most Douglas-fir killed exceeds 120 years. Under some conditions younger (80-120 years) trees can be killed. (4) Disease. - There is a positive relation between endemic Douglas-fir beetle populations and diseased trees. The presence of root disease in mature trees probably contributes to susceptibility by increasing moisture stress. (5) Injuries - Injuries such as fire, wind and snow breakage, and insect defoliation can predispose individual trees or stands to beetle attack. Any of these factors which substantially reduce tree vigor will render the trees more attractive and susceptible to beetle depredation.

Many Douglas-fir stands in the Lyon-Madison River drainage are highly susceptible to Douglas-fir beetle. The top kill resulting from several years of repeated budworm defoliation provided the triggering mechanism for a population increase of Douglas-fir beetle.

METHODS

Plots were established in stands at Lyon's Face, and south along the Madison River to determine amount of defoliation from western spruce budworm, and subsequent tree mortality from Douglas-fir bark beetles.

Estimates were obtained using variable plots (40 BAF) at 5-chain intervals throughout each area. Trees 5 inches d.b.h. and larger were tallied and classed as follows:

0 = green

1 = current attack - brood present

2 = 1-year-old attack - brood emerged, red foliage

3 = 2 years and older attack - foliage missing

4 = unsuccessful attack or pitchout, green foliage

5 = strip attack

6 = defoliation rating - light; medium; heavy; top killed.

Trees were recorded by d.b.h. and the height of two tree species/plot were measured. At plot center, regeneration was measured on a 1/300-acre plot. Data were analyzed using the INDIDS computer program (Bousfield 1981).

RESULTS

Results of plot data are shown in table 1.

Table 1.--Tree mortality from Douglas-fir beetle, Madison Ranger District 1980-1982.

	LYON			
	1980 [1/]	1981	1982	Total
Trees/acre	24.9	5.7	11.1	1.7
Bd. ft/acre	7,718.0	2,414.0	3,804.4	13,936.4
Avg. d.b.h.	19.2	22.7	19.4	20.6
	MADISON RIVER			
Trees/acre	24.0	0	12.1	36.1
Bd. ft/acre	3,594.0	0	1,335.0	4,929.0
Avg. d.b.h.	16.2	0	15.1	15.7

1/ 1980 equals tree mortality from 1978, 1979, and 1980.

Stands in the Lyon Area are pure and of larger d.b.h. Douglas-fir. The beetle has and will continue to cause more tree and volume loss in these stands.

In the Madison area, stands are mixed species (53.6 percent Douglas-fir, 38 percent lodgepole pine, 8.4 percent spruce), smaller d.b.h., and younger age class resulting in fewer trees and less volume being killed/acre.

Although the beetle population appears to have declined from 1980 to 1982, we don't think this is the case. Needles had dropped from the dead trees, and mortality prior to 1980 could not be accurately identified by year of death and was, therefore, grouped with trees killed in 1980.

Of the Douglas-fir trees attacked by Douglas-fir beetle in 1982, 51 percent were heavily defoliated with some top kill, 2 percent were moderately defoliated, and 5 percent were lightly defoliated. Crown ratio of defoliated and Douglas-fir beetle infested trees did not differ significantly by area.

Douglas-fir stands (80-150 years old, 16-28 inches d.b.h.) at Lyon's Face and in other areas along the Madison River have been heavily infested with western spruce budworm for about 6 years. Top kill is prevalent and some budworm-caused mortality has occurred to reproduction over several hundred acres of critical wildlife habitat. Douglas-fir beetle populations have infested large diameter top-killed Douglas-fir and have increased to epidemic levels the past 3 years.

Budworm populations are increasing in the Elk Creek drainage. The situation that developed at Lyon, and in several other areas along the Madison, could develop in the Elk Creek stands if the budworm infestation persists.

Because a significant number of susceptible Douglas-fir have been top killed and budworm populations are remaining epidemic, we predict that Douglas-fir beetle populations will continue to increase and cause significant tree and volume loss in defoliated as well as adjacent susceptible stands for 5-7 more years.

RECOMMENDATIONS

Research results show that an aerially applied granular formulation of MCH to green and/or green infested stands is effective in reducing Douglas-fir beetle-caused mortality (Edwards 1982). In stands containing mature-overmature, top-killed Douglas-fir, and adjacent stands where budworm defoliation has been classed heavy to very heavy and continued heavy defoliation is predicted in 1983, an application of MCH should be effective in preventing additional excessive Douglas-fir beetle-caused mortality. This would be particularly true if these stands are being managed for other values in addition to timber production.

Since tree mortality is predicted to increase, we recommend an aerial application of MCH, 36 gm AI/ac, to reduce Douglas-fir beetle-caused tree mortality in critical wildlife habitat along the Madison River in the future.

We also recommend that Douglas-fir stands should be hazard rated for potential budworm damage, and a management plan, including silvicultural treatments and aerial spraying, should be implemented where economically and environmentally feasible to prevent the situation that exists along the Madison from expanding or developing in additional stands.

Minimal windthrow of Douglas-fir has been occurring for some time in the Dirty Teepee Sale in Elk Creek drainage. Several infested down trees and adjacent standing trees were observed.

The following was concluded from the Dirty Teepee Sale: Trees are lying in all directions, probably from:

1. Swirling winds.

2. Heavy snow loads.

3. High soil moisture.

4. Some root/butt rot caused by Phaeolus schweinitzii.

P. schweinitzii decay was incipient in some smaller roots, but the amount was insignificant. Phellinus (Fomes) pini stem decay is probably widespread in the larger trees; conks were seen on several large Douglas-fir.

We recommend that windthrow be salvaged during the planned timber sale. A shelterwood harvest with additional small clearcuts would remove infested Douglas-fir and high risk (to mountain pine beetle) lodgepole pine, leaving a manageable stand. We also recommend management of budworm prior to or following the timber sale. If this isn't done, top kill or mortality of reproduction will occur, and little seed will develop for natural regeneration.

No root/butt disease was seen in stands near the Lyon Work Center. This same area was also checked by CFPM pathologists Sue Dubreuil and Jim Byler in September 1981. Root disease was not observed during their examination.

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